(B) AMENDMENTS TO THE CLAIMS

1. (Original) A method for imaging prestack seismic data, comprising:
calculating an individual reflectivity for each frequency in the seismic data;
calculating a mean reflectivity over the individual reflectivities;
calculating a variance for the individual reflectivities;
calculating a variance for the upgoing wavefield in the seismic data, using the mean reflectivity;
calculating a spatially varying pre-whitening factor, using the variance for the reflectivities and the variance for the upgoing wavefield; and
calculating a reflectivity using the spatially varying pre-whitening factor.

2. (Original) The method of claim 1, wherein the step of calculating a variance for the upgoing wavefield comprises applying the following equation:

$$\sigma_U^2(\mathbf{x}) = \frac{1}{n-1}\sum_{j=1}^{n}\left[U(\mathbf{x},\omega_j) - \langle R(\mathbf{x})\rangle \cdot D(\mathbf{x},\omega_j)\right]^2,$$

where $\sigma_U^2(\mathbf{x})$ is the variance for the upgoing wavefield, x is the spatial location, n is the number of frequencies ω_j, $U(x,\omega_j)$ is the upgoing wavefield, $<R(x)>$ is the mean reflectivity, and $D(x,\omega_j)$ is the downgoing wavefield.

3. (Original) The method of claim 1, wherein the step of calculating a spatially varying pre-whitening factor comprises applying the following equation:

$$\varepsilon(\mathbf{x}) = \frac{\sigma_U^2(\mathbf{x})}{\sigma_R^2(\mathbf{x})},$$

where $\varepsilon(x)$ is the spatially varying pre-whitening factor, σ_U^2 is the variance for the upgoing wavefield, and $\sigma_R^2(\mathbf{x})$ is the variance for the reflectivities.

4. (Original) The method of claim 1, wherein the step of calculating a reflectivity using the spatially varying pre-whitening factor comprises applying the following equation:

$$R(\mathbf{x}) = \frac{1}{n}\sum_{j=1}^{n} \frac{U(\mathbf{x},\omega_j)\, D^*(\mathbf{x},\omega_j)}{|\,D(\mathbf{x},\omega_j)\,|^2 + \dfrac{\sigma_U^2(\mathbf{x})}{\sigma_R^2(\mathbf{x})}},$$

where $R(x)$ is the reflectivity, x is the spatial location, n is the number of frequencies ω_j, $U(x,\omega_j)$ is the upgoing wavefield, $D(x,\omega_j)$ is the downgoing wavefield, σ_U^2 is the variance for the upgoing wavefield, and $\sigma_R^2(x)$ is the variance for the reflectivities.

5. (Currently amended) A method for imaging prestack seismic data, <u>comprising:</u>

<u>constructing a downgoing wavefield for each frequency in the seismic data;</u>

<u>constructing an upgoing wavefield for each frequency in the seismic data;</u>

<u>calculating a reflectivity at a spatial location from the downgoing and upgoing wavefields using a least squares approach with a pre-whitening factor,</u>

wherein ~~a~~ <u>the</u> least squares approach comprises applying the following equation:

$$R(\mathbf{x}) = \frac{\frac{1}{n}\sum_{j=1}^{n} D^*(\mathbf{x},\omega_j)\, U(\mathbf{x},\omega_j)}{\frac{1}{n}\sum_{j=1}^{n} D^*(\mathbf{x},\omega_j)\, D(\mathbf{x},\omega_j) + \varepsilon},$$

where $R(x)$ is the reflectivity, x is the spatial location, n is the number of frequencies ω_j, $U(x,\omega_j)$ is the upgoing wavefield, $D(x,\omega_j)$ is the downgoing wavefield, and ε is ~~a~~ <u>the</u> pre-whitening factor.